Other subjects referred to were the educational work of the Victoria and Albert Museum, the new advisory spirit in which the inspection of schools is to be carried on, and the provision by local authorities of a better system of training teachers than at present exists.

TWO pamphlets referring to the purpose and programme of the Faculty of Commerce of the University of Birmingham have been received. The Faculty will begin its work in October next and there will be matriculation examinations on June 2 and September 15. In the course of his prospectus, Prof. Ashley remarks that the object of the work to be carried on by this department of the University is the education, not of the rank and file, but of the officers of the industrial and commercial army: of those who, as principals, directors, managers, secretaries, heads of departments, &c., will ultimately guide the business activity of the country. The Faculty represents the first serious attempt to provide training of this kind, though every year shows the need of it. Prof. Ashley points out that the marked acceleration of the speed of industrial and commercial change, the application of science to machinery involving more frequent changes in manufacturing processes, and the extension of means of communication, call more and more for mental flexibility, alertness and adaptability on the part of traders. But such qualities are certainly not likely to be stimulated by early absorption in the subordinate routine of a particular occupation. There is, however, some chance of promoting them by courses of instruction which shall accustom the future trader to survey a wide range of industrial undertakings, to watch the development of the world's great markets, and to estimate the resources and capabilities of other nations. The curriculum which has been drawn up for the three years' course leading to the degree of Bachelor of Commerce in the University of Birmingham comprises studies which fall mostly into four main categories:—(1) languages and history; (2) accounting; (3) applied science and business technique; (4) commerce. The purpose of the scientific subjects included in the course is not to make men scientific experts. Its aim is (*a*) to make their business more interesting to them; (*b*) to enable them to follow the general movement of technological progress, and to realise the directions in which changes of process are probable or possible; (*c*) to show them when they ought to call in an expert, and how much weight they should attach to his opinion.

SCIENTIFIC SERIALS.

Journal of Botany, May.—Mr. Rudolf Beer describes a rare and remarkable conidia-bearing fungus, *Coemansiella Alabastrina*, which has only been recorded twice before. The conidiophore begins like Eruotium, but the sterigmata are few in number and grow out forming a circlet of arms; from each of these a series of conidia is cut off on the upper side. The conidia are fusiform and pointed at both ends. Chlamydospores and other conidial bodies were obtained in the culture, but no traces of perithecia were observed.—Mr. Pugsley has devoted considerable attention to the British "capreolate" Fumitories and submits the following classification:—Subsection 1. *Eucapreolatae.* Bracts as long as pedicel; pedicel recurved; fruit pendulous, narrow at the base. (1) *F. capreolata*, L. (=*F. pallidiflora*, Jord.). (2) *F. purpurea*, Pugsley, which refers to certain English plants named as *F. Boraei*, Jord., but differing from Jordan's original discription. Subsection 2. *Murales.* Bracts shorter; pedicels erect; fruit without a neck. (3) *F. muralis*, Sond. (includes *F. Boraei*, Jord.). (4) *F. confusa*, Jord.—Dr. Rendle describes three new species of Convolvulus from South Africa, a Convolvulus, and two Ipomæas which we regret to find are named after the collectors instead of receiving distinctive names.—Mr. G. C. Druce gives a list of Anglesey and Carnarvonshire plants and Mr. J. Hunter records North Donegal mosses.

Bulletin of the American Mathematical Society, vol. viii. (2) No. 7, April.—S. E. Slocum, on the transformation of a group into its canonical form. A discussion of the Lie group defined by $X_1=\delta/\delta x_2$, $X_2=x_2\delta/\delta x_2+\delta/\delta x_1$.—O. Dunkel, some applications of Green's theorem in one dimension. The theorem thus designated is an integral relation deduced from a linear differential equation and its adjoint. Some applications follow.—V. Snyder, on the forms of quintic scrolls.—E. V. Huntingdon, simplified definition of a group. This interesting paper defines a group as an assemblage of elements satisfying the three postulates: (1) Given any two elements a, b, there is an element x such that $ax=b$; (2) there is an element y such that $ya=b$; (3) if a, b, c, ab, bc, and either $(ab)c$ or $a(bc)$ are elements of the assemblage, then $(ab)c=a(bc)$. A finite group requires the additional postulate that the assemblage shall contain only n elements.—L. P. Eisenhart, on isotropic congruences.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 23.—Prof. S. P. Thompson, president, in the chair.—Mr. T. C. Porter showed a lecture experiment on the ebullition of rotating water. If the water in a beaker, having approximately vertical sides, be caused to rotate about an axis concentric with the vertical geometrical axis of the beaker, it is obvious that in any horizontal section of the water the pressure is least in the centre and increases from the centre outwards. If the temperature of the water is just below boiling point and heat is supplied to it whilst it is rotating steam is formed only in the region of least pressure, and a gaseous core is produced. The rotation can be given to the water by stirring it with a glass rod covered with a piece of india-rubber tubing, and maintaining the stirring motion during the act of withdrawal of the rod. Some curious phenomena are shown by the column of steam, if the water is first stirred and then left to come to rest whilst the heating is continued. At first there is a markedly concave surface to the water in the beaker, and the column of steam is practically continuous from base to summit. After this stage pulsations set in. Pulsations can also be produced by stirring cold water in a beaker-shaped jar, having a small hole in its bottom through which a stream of air-bubbles can be blown. The forms of the steam columns in some cases present a likeness to those of solar prominences, and Mr. Porter suggested that the immediate cause of the latter might be the diminution of pressure on the sun's surface at, or near, the centre or centres of depressions caused by violent cyclonic disturbances in the solar atmosphere.—Mr. C. V. Boys exhibited a small heat engine in which rotating water evolved steam without ebullition.—A paper by Mr. J. A. Erskine on the conservation of entropy was read by the secretary. Heat energy may be expressed as the product of two factors—a quantity factor, entropy, and an intensity factor, temperature. The conservation of entropy holds in thermodynamics when dealing with reversible processes, and is analogous to the conservation of other quantity factors such as momentum, moment of momentum, and electric quantity. The author shows the completeness of the analogies by considering Carnot cycles carried out on electrostatic and hydraulic engines. Prof. Wiedeburg has proposed to extend the doctrine of the conservation of entropy to irreversible processes by introducing a new quantity analogous to electric resistance.—A paper by Sig. G. Giorgi on rational units of electromagnetism was read by Mr. Price. Mr. Price prefaced the reading of the paper by saying that both Prof. Fleming and Prof. Fessenden had advocated a partial change of units which would leave the most important ones unchanged, and the method employed by the author was similar to that adopted by Prof. Fessenden. The author starts with a set of three equations, which contain explicitly the four concrete units of E.M.F., M.M.F., electric current and magnetic current, together with that of activity, and considers them as fundamental in electromagnetism. Two fundamental units are required to express these quantities, and their product must reproduce the mechanical unit of activity. If the watt is assumed as unit of activity, there are two units ready made, the volt and the ampere, which satisfy the condition and may be considered fundamental. All concrete units in electricity and magnetism can be expressed in terms of these and the second as unit of time. In order to complete the system, a unit of length is required. The metre and kilogramme are consistent with the watt, and putting them together with the units enumerated in the paper, the author has built up an absolute metre-kilogramme-second system which comprises electric, magnetic and mechanical measures in a consistent frame.

Chemical Society, May 15.—Dr. W. H. Perkin, F.R.S., vice-president, in the chair.—The variation with temperature of the surface-tensions and densities of liquid oxygen, nitrogen, argon and carbon monoxide, by Messrs. E. C. C. Baly and

F. G. Donnan. The measurements were made by a modification of Ramsay and Shield's method between 70° and 90° absolute, and the results were found to be in accordance with the view that these liquids consist of non-associated molecules. The critical temperatures deduced from these observations are in agreement with those directly determined for oxygen and nitrogen, but not with the values assigned to argon and carbon monoxide for this constant.—Comparison of bromonitrocamphane with bromonitrocamphor, by Dr. M. O. Forster. The action of various reagents on bromonitrocamphor has been examined in the hope of isolating derivatives of the latter substance analogous to those obtained from bromonitrocamphane, but in most cases the reactions proceed either further or in a different sense.—$\alpha\alpha$-Benzoylnitrocamphor and $\alpha\alpha$-benzoyliodocamphor, by Dr. M. O. Forster and Mr. E. A. Jenkinson. A description of these substances and several of their derivatives is given illustrating the peculiar $\alpha\alpha'$-isomerism of substituted camphors.—2 : 4-Dibromo-5-nitro- and 2 : 4-dibromo-3 : 5-dinitrotoluenes and their behaviour on reduction, by Mr. W. A. Davis. These substances are produced by the direct nitration of 2 : 4-dibromotoluene, and on reduction furnish respectively 4 : 6-dibromo*meta*-toluidine and *sym.*tolylene diamine.—The purification of hydrochloric acid from arsenic, by Dr. Thorne and Mr. E. H. Jeffers. The purification of hydrochloric acid to be used in testing for arsenic may be accomplished by digesting in it pieces of bright copper gauze, so long as these become stained by the deposition of arsenic on their surface.—The radioactivity of thorium compounds, and the cause and nature of radioactivity, by Prof. Rutherford and Mr. Soddy. Thorium, from which the radioactive substance Th.X has been separated, regains its activity after a time, while that of Th.X. slowly disappears. This production and disappearance of activity is not affected by any known agents, and proceeds independently of the physical and chemical conditions of the molecule; the authors believe that the source of this energy is to be found in a chemical change producing new types of matter.—The radioactivity of uranium, by Mr. F. Soddy. Prof. Rutherford has already shown that uranium exhibits a dual radiation, one, α, having little action on a photographic plate and a second, β, almost inactive to the electrometer under ordinary conditions. The author now finds that the substance Ur.X isolated from uranium possesses only the β-radiation, the α-effect being retained by the parent substance.

Royal Meteorological Society, May 21.—Mr. W. H. Dines, president, in the chair.—Captain D. Wilson-Barker read a report prepared by Mr. Dines and himself on the wind force experiments which had been made on H.M.S. *Worcester* off Greenhithe and at Stoneness Lighthouse, 817 yards from the ship on the north bank of the river. These experiments were in continuation of those on the exposure of anemometers at different elevations which were carried out on the *Worcester* a few years ago. All the observations were made with the pressure-tube anemometer. The broad general result is that the lighthouse experiences steadier and stronger winds than the *Worcester*, the velocity being about 6 per cent. greater, notwithstanding the fact that the elevation is less than half, but that in both positions the extreme velocities reached in the gusts are about equal.—Dr. H. R. Mill read a paper on the Cornish dust fall of January, 1902. When the west of England newspapers of January 24 announced falls of "pink snow" and "muddy rain" in several parts of Cornwall and South Wales, it seemed to the author possible that fresh light might be thrown on what is at present the chief object of progressive meteorology, viz. the movements of the upper air. He therefore took steps to collect as much information as possible from the whole of the district, and found that the phenomenon was reported from seventy-five different places in the south-west of England and Wales. These were all south of a line joining Milford Haven and Chepstow, and west of the meridian of Bath. By means of a map, Dr. Mill showed that four separate areas were visited by the dust between January 21 and 23, viz. (1) Cornwall, 1400 square miles; (2) North Devon, 150 square miles; (3) Milford Haven, 50 square miles; and (4) Bristol Channel, 600 square miles. The dust appears to have been confined mostly to low rather than high ground, for none was reported to have fallen on the Mendip Hills, Dartmoor, Exmoor and the Welsh mountains. The observations show that January 22 was undoubtedly the day when most falls occurred and that the colour of the dust was yellowish or brownish. From a consideration of the meteorological conditions at the time and for several days before, the author is inclined to believe that the evidence points to the dust having been transported in the upper air from the African deserts.

EDINBURGH.

Royal Society, May 5.—Prof. Geikie in the chair.—A paper was communicated by Prof. Beattie on the leakage of electricity from charged bodies at moderate temperatures (part iii.). The paper described a great variety of experiments in which such substances as common salt, lithium chloride and potassium bichromate, when laid on zinc and sprinkled with iodine or bromine, and then raised to a temperature between 300° and 350° C., caused electrification of the surrounding atmosphere of air, coal gas, oxygen or carbonic acid gas. Hydrogen was not electrified under similar conditions. The effects differed from those produced in other ways. Thus, in addition to the well-known electrifying properties of flames and their fumes, there seem to be three distinct methods of obtaining an electrified gas by heating: (1) by oxidation or deoxidation as in the atmosphere drawn from the neighbourhood of oxidising or deoxidising metals (Schuster), (2) by driving off a gas which carries a charge with it as in the case of the gas obtained by heating potassium permanganate (Townsend), (3) by the methods described in the present paper.—Prof. MacGregor communicated a paper by the late Prof. C. Piazzi Smyth, Does the spectrum place of the sodium lines vary in different azimuths? The paper bore the date May 25, 1882, and the investigation had been suggested by Prof. Tait, among whose papers the manuscript had been found. The apparatus used consisted of a Rutherford grating with 17,296 lines to the inch, the necessary collimator and telescope, and an end-on vacuum tube containing sodium vapour. The whole was set up on a rotating table, and measurements of the positions of the D lines were made in various azimuths. The results were negative. An idea of the sensitiveness attained may be gained from the statements that the two principal D lines were separated by 266 micrometer divisions, and that the probable error of observation was two of these divisions.

PARIS.

Academy of Sciences, May 20.—M. Bouquet de la Grye in the chair.—On the optical arrangements necessary for remedying the visual troubles in cases of keratoconia, by M. J. Janssen. A description of a lens system by means of which the effect of this disease can be almost entirely compensated.—On the composition of the ashes projected from Mont Pelée on May 3, 1902, by M. Michel Levy. Andesine and hypersthene were recognised as the chief constituents of the volcanic ash.—On the spermatogenesis of the diptera of the genus Sciara, by M. Alfred Giard. The emission of the spermatic elements in Sciara is accompanied by phenomena nearly as complicated as in the Cephalopods. There is no production of a capsule forming a true spermatophore.—The addition of hydrogen to ethylenic hydrocarbons by the method of contact, by MM. Paul Sabatier and J. B. Senderens. The catalytic action of reduced nickel and copper in causing the addition of hydrogen to unsaturated hydrocarbons has been extended to propylene, trimethylethylene, hexene and octene. Propylene mixed with hydrogen in excess is readily transformed by reduced nickel at 160° C. into propane; copper behaves similarly, but the reaction is slower. Trimethylethylene is similarly converted into pure methylbutane in the presence of nickel, but copper is without action in this case. It has been found that copper and nickel are equally capable of effecting the addition of hydrogen in the case of ethylene derivatives containing the grouping $=CH_2$, but that compounds of the type $R.C=CR'$ do not add on hydrogen under the action of copper. Application is made of this to the case of limonene, with the result that the formula ordinarily attributed to it, representing it as containing a $=CH_2$ group, is confirmed.—On the arithmetical properties of entire and quasi-entire functions, by M. Edmond Maillet.—On the repulsive force and electrical actions emanating from the sun, by M. H. Deslandres. A criticism of the views of S. Arrhenius, with some remarks on the nature of nebulæ.—On the constitution of matter and spectroscopy, by M. B. Eginitis. The author regards the elimination of air lines in Schuster and Hemsalech's work on spark spectra as being chiefly due to the metallic vapours produced.—The action of light on precious stones, by M. Chaumet. A connection is shown to exist between the

fluorescence of a diamond under violet light and its lustre under ordinary artificial light. In the case of a yellow diamond, after a short exposure to violet light, the colour changed from yellow to a dark brown; after twenty-four hours, however, the diamond recovered its original colour and lustre.—The volumetric estimation of iodides in the presence of chlorides and bromides, by M. V. Thomas. In dilute solution, in the presence of an excess of a thallic salt such as the chloride, the whole of the iodine in the iodide is set free. Test analyses are given showing the accuracy and range of the method.—On the action of sulphites on the nitroprussiates, by M. Juan Fages.—On a method of gradual synthesis of aldehydes, by MM. L. Bouveault and A. Wahl. Nitroisobutylene, reduced by aluminium amalgam or by zinc dust and acetic acid, is converted into isobutyric aldoxim. Nitrostyrolene, C_6H_5—CH=CH—NO_2, was found to undergo a similar change on reduction by either of the above-mentioned reagents, giving phenylacetaldoxime.—The sexual elements and fertilisation in Pterocephalus, by MM. Louis Léger and Octave Duboscq.—On the destruction of certain noxious insects in agriculture and especially the wire worm in the plum-tree, by M. J. Laborde. The composition and mode of application of an insecticide is given which has been proved by experiment to be efficacious in combating the parasite.—*Sarcocystis tenella*, a parasite of man, by M. Paul Vuillemin.—On *Kinkeliba* and its botanical origin, by MM. E. Perrot and G. Lefèvre. Kinkeliba is an arborescent plant the leaves of which are employed by the natives all over western Africa as a medicine, and which merits a complete therapeutical study. It is identified as *C. micranthum*.—On the tectonic relations between Greece and western Crete, by M. L. Cayeux.—A point of the geology of the neighbourhood of Bayonne, by M. R. Chudeau.—On a principle of rational classification of gorges cut by water courses, by M. Jean Brunhes.—The microbiological study of the steeping of flax, by M. L. Hauman. The aërobic rotting of flax has been accomplished with pure cultures of various organisms, including *Penicillium glaucum*, *Aspergillus niger*, *Botrytis cinerea*, *Bacillus coli communis* and others. The process appears to consist essentially in the fermentation of pectic bodies, considerable quantities of which are present in the original flax, but of which traces only can be found after fermentation. The rotting of flax is thus a purely biological process which is accomplished by means of the bacteria and moulds of the soil. The disintegration is due to the disappearance of the tubes of the young tissues filled with pectic substances which separate the fibro-vascular bundles.—The influence of lecithin on the development of the skeleton and of nervous tissue, by MM. A. Desgrez and Aly Zaky. It is shown that the increase in weight of animals receiving lecithin is not due to an abatement of nutrition, but is due to the phosphoric acid retained by the organism, under the influence of the lecithin, being normally utilised for the development of the osseous and nerve-cells.—The vaccination against pasteurelloses, by MM. Joseph and Marcel Lignières. The name pasteurelloses is applied to a group of diseases of the same type, including typhoid fever and pneumonia of the horse, chicken cholera and hæmorrhagic septicæmia of the sheep, ox and pig. It has been proved by experiment that it is possible to prevent these diseases by a process of vaccination.—The etiology of the canker and gum in fruit trees, by M. F. P. Brzezinski.

DIARY OF SOCIETIES.

THURSDAY, MAY 29.

ROYAL SOCIETY, at 4.30.—The Minute Structure of Metals and other Plastic Solids: G. Beilby.—The Influence of Varying Amounts of Carbon Dioxide in the Air on the Photosynthetic Process of Leaves and on the Mode of Growth of Plants: H. T. Brown, F.R.S., and F. Escombe.—On the Influence of an Excess of Carbon Dioxide in the Air on the Form and Internal Structure of Plants: Prof. J. B. Farmer, F.R.S., and S. E. Chandler.—On the Structure of the Gills of the Lamellibranchia: Dr. W. G. Ridewood.

SOCIETY OF ARTS, at 4.30.—Western Australia: its Progress and Resources: Hon. J. W. Venn.

INSTITUTION OF MINING ENGINEERS (Geological Society), at 11.—Working Coal under the River Hunter, the Pacific Ocean and its Tidal Waters, near Newcastle, New South Wales: A. A. Atkinson.—Lead and Zinc Deposits of the Mississippi Valley, U.S.A.: Prof. C. R. Van Hise and H. Foster Bain.—The Campbell Coal-washing Table: Clarence R. Claghorn.—The Mining, Concentration and Analysis of Corundum in Ontario: Dr. W. L. Goodwin.—Re-opening of Hartley Colliery: R. E. Ornsby.—Deposits of Hydroborate of Lime: its Exploration and Refination: Carlos A. Lynes Hoskold.—Remarks on Mr. M. Walton Brown's "Report on Mechanical Ventilators": Prof. A. Rateau.

FRIDAY, MAY 30.

ROYAL INSTITUTION, at 9.—The Electronic Theory of Electricity: Prof. J. A. Fleming, F.R.S.

INSTITUTION OF MINING ENGINEERS (Geological Society), at 10.30.—The Training of Industrial Leaders: Prof. J. Wertheimer.—Smelting in British Columbia: W. Denham Verschoyle.—Treatment of Low-grade Copper-ores in Australia: J. J. Muir.—The Tarkwa Gold-field, West Africa: A. R. Sawyer.—Gold-dredging: T. Ross Burt.—Gold-dredging in Otago, New Zealand: F. W. Payne.—Electric Traction on Roads and Mineral Railways: W. R. Cooper.—The Analytical Valuation of Gas-coals: G. P. Lishman.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—A Doubtful Case of Hæmorrhagic Smallpox: S. Murphy and Dr. Klein, F.R.S.—An Outbreak of Syphilis in an Indigenous Tribe in India: Dr. L. Rogers.

MONDAY, JUNE 2.

INSTITUTE OF ACTUARIES, at 5.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—A Contribution to the Chemistry of Whiskey, I.: Dr. P. Schidrowitz.—The Estimation of Perchlorate in Saltpetre, &c.: Dr. A. Dupré, F.R.S.—On the Will Test for Nitrocellulose: Dr. R. Robertson.—On the Effect of the Alcohol Duty on Chemical Industries: Dr. O. Silberrad.

TUESDAY, JUNE 3.

ZOOLOGICAL SOCIETY, at 8.30.—The Wild Sheep of the Upper Ili and Lower Lena Valleys: R. Lydekker, F.R.S.—On Differences in Dicynodont Skulls, apparently due to Sex: Dr. R. Broom.—On the Gonad Ducts and Nephridia of Eudrilus: F. E. Beddard, F.R.S.

ROYAL INSTITUTION, at 3.—The Laws of Heredity, with special Reference to Man: Prof. Karl Pearson, F.R.S.

WEDNESDAY, JUNE 4.

ENTOMOLOGICAL SOCIETY, at 8.—The Butterflies of Chile, with an Exhibition of Specimens: Henry J. Elwes, F.R.S.—The Protective Resemblance to Flowers borne by an African Homopterous Insect: S. L. Hinde.

THURSDAY, JUNE 5.

ROYAL SOCIETY, at 4.30.

CHEMICAL SOCIETY, at 8.—The Action of Ungerminated Barley Diastase on Starch. Part I.: J. L. Baker.—The Decomposition of Chlorates. Part V. Potassium Chlorate in presence of Oxides of Manganese: W. H. Sodeau.

RÖNTGEN SOCIETY, at 8.30.—The Sources of Phosphorescence: Herbert Jackson.

LINNEAN SOCIETY, at 8.—On certain Species of Dischidia and their Double Pitchers: H. H. W. Pearson.—(1) On "Silver-leaf" Disease of Plums; (2) Observation on the Occurrence of Crystals of Calcium Oxalate in Seedlings of Alsike (*Trifolium hybridum*, Linn.): Prof. J. Percival.—On the Morphology of the Cerebral Commissures in the Vertebrata: Dr. Elliot Smith.

FRIDAY, JUNE 6.

ROYAL INSTITUTION, at 9.—The Nile Reservoir and Dams: Sir Benjamin Baker, K.C.M.G., F.R.S.

GEOLOGISTS' ASSOCIATION, at 8.—On a Peculiarity in the Course of Certain Streams in the London and Hampshire Basins: H. J. Osborne White.—Note on the Occurrence of *Microtus intermedius* in the Pleistocene Deposits of the Thames Valley: M. A. C. Hinton and G. White.

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